

# Design of the Peduli Tani Android-Based Application for Increasing Dragon Fruit Farming Productivity in Beganding Village Using User-Centered Design (UCD)

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## Abstract

Design is a systematic process that involves creating a plan to achieve specific objectives, encompassing the identification of needs, analysis, and the design of effective and efficient solutions. In the context of application design, collaboration among various disciplines is essential to ensure proper integration of all design aspects. Applications, as software tools that assist users in completing various tasks, have become increasingly important in daily life with a wide range of types and functions. Android, as a Linux-based operating system for mobile devices, provides an open platform for application developers. The "Peduli Tani" application is designed to enhance agricultural productivity through technical guidance and information related to crop management. The User-Centered Design (UCD) approach is applied to ensure that the product design meets the needs and preferences of end-users, thereby improving user experience and satisfaction. By prioritizing the user's perspective, the application design is expected to deliver relevant and effective solutions.

**Keywords:** Design, Application, Android, Peduli Tani, User-Centered Design, Agricultural Productivity

## 1. Introduction

With technological advancements, computers are expected to simplify work, activities, and operations in various fields, including agriculture [1]. The design of the *Peduli Tani* application serves as a strategic solution to overcome these challenges. This application is designed to provide up-to-date information on the latest cultivation techniques and risk management. Such productivity improvements will, in turn, contribute to the enhancement of farmers' welfare. The utilization of Information and Communication Technology (ICT) can be one of the strategies to achieve this goal [2].

Farmers play a crucial role in ensuring adequate food supply for the population [3]. However, the information they receive is often unstructured and limited to local experiences. This results in a gap in modern agricultural knowledge, which can hinder agricultural productivity. The lack of proper facilities is also caused by limited access to knowledge and information.

The development of agricultural technology, which remains ineffective in land management, makes it difficult to trace and address problems when they arise [4]. By increasing farmers' access to accurate and timely information through the *Peduli Tani* application, it is expected that a more resilient and self-reliant agricultural community can be established in Tanah Karo. This not only has the potential to increase individual farmers' incomes but also to bring positive impacts on the local economy and overall community welfare.

In the digital era, agricultural extension workers, in line with the upcoming Industrial Revolution 5.0, will play a significant role as bridges or facilitators in transferring new technologies and innovations in agriculture—whether in technical, social, or economic aspects [5]. Thus, the design of this application is not only about adopting technology but also about fostering economic and environmental sustainability for agricultural communities in Tanah Karo.

## 2. Theoretical basis

### 2.1 Definition of Design

Design is a crucial process in various fields, such as product design, architecture, information systems, and even in business strategy planning. Essentially, design is a series of well-planned activities aimed at creating a solution or product that meets specific needs while maximizing the available resources. Design is not only about making something look good or attractive but also involves in-depth analysis of functionality, efficiency, cost, and the long-term impact of the solution. Therefore, design requires a structured and creative approach, along with a deep understanding of the problems and needs that need to be addressed.

## 2.2 Android Applications

An Android application is software designed to run on the Android operating system. Android itself is an open-source operating system developed by Android Inc. in 2003, which was later acquired by Google in 2005. Android is designed for mobile devices such as smartphones, tablets, and other devices, and has now become the most widely used operating system in the world.

## 2.3 User-Centered Design

User-Centered Design (UCD) is an approach in the design process of products, systems, or services that places the user at the center of all design activities. In UCD, all design decisions are made by considering the needs, preferences, and limitations of end-users. The main goal of UCD is to create products that are not only effective and efficient but also enjoyable and easy for users to operate.

## 2.4 Previous Research

UCD is a method that emphasizes the needs and preferences of users during the product design process [5]. It aims to develop products that are not only functional but also intuitive and enjoyable for users. Research findings have shown that the UCD approach is effective in meeting user needs—in this case, students—through several stages involving needs analysis, iterative design, and evaluation. The resulting learning media are not only visually appealing [6], but one of the main principles in this research is user experience-focused design. This means that the system interface must be easy to use, effective, and provide satisfaction for its users.

## 2.5 Tanah Karo

Tanah Karo is a region located in North Sumatra, Indonesia. It is known for its natural beauty, rich culture, and abundant agricultural potential. Situated in the highlands with a cool climate, Tanah Karo offers a variety of natural and cultural elements that are worth exploring.

## 2.6 Dragon Fruit

One of the agricultural commodities that has been increasingly developing in Tanah Karo is dragon fruit (*Hylocereus spp.*). Dragon fruit has become one of the promising horticultural crops for the people of Tanah Karo, offering benefits in terms of economy, health, and agricultural sustainability.

## 3. Research Methods

Use Case scenarios describe the steps illustrating how the application will be used by its users in various situations. The following are several examples of Use Case scenarios to be implemented in the *Peduli Tani* application:

### 1. Use Case 1: Farmer Registers and Creates an Account

Application User: Farmer

Description: The farmer opens the *Peduli Tani* application for the first time and registers by entering personal information such as name, address, and phone number.

Steps:

- a. The farmer opens the application.
- b. The farmer selects the "Register" option on the main page.
- c. The farmer fills in personal data, including name, address, and phone number.
- d. The farmer presses the "Register" button to complete the registration process.

Expected Result: The farmer successfully registers and logs into the application with a new account.

### 2. Use Case 2: Farmer Searches for Weather Information

Application User: Farmer

Description: The farmer wants to check current weather conditions to plan agricultural activities.

Steps:

- a. The farmer opens the application.
- b. The farmer selects the "Weather Information" menu on the main page.
- c. The farmer views the displayed weather forecast.
- d. The farmer uses this information to plan farming activities.

Expected Result: The farmer obtains accurate weather information to help plan agricultural activities.

### 3. Use Case 3: Farmer Accesses Agricultural Technique Guides

Application User: Farmer

Description: The farmer wants to find tips and tutorials to improve agricultural productivity.

Steps:

- a. The farmer opens the *Peduli Tani* application.
- b. The farmer selects the "Agricultural Guide" menu.
- c. The farmer chooses the desired guide category.
- d. The application displays the guide that matches the farmer's choice.

Expected Result: The farmer gains useful information to increase crop yields.

### 4. Use Case 4: Farmer Joins a Discussion Forum

Application User: Farmer

Description: The farmer wants to discuss agricultural problems with other farmers or agricultural experts.

Steps:

- a. The farmer opens the *Peduli Tani* application.

- b. The farmer selects the "Discussion Forum" menu.
  - c. The farmer joins a relevant forum or starts a new discussion.
  - d. The farmer interacts with forum members to obtain solutions or share experiences.
- Expected Result: The farmer gets answers to questions or solutions to problems through discussions with other farmers.

#### 4. A step before the final submission

The following presents the results of the *Peduli Tani* application after completion:

##### 1. First Screen

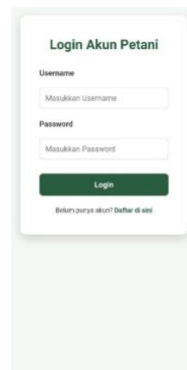
The first screen of the *Peduli Tani* application is the welcome page. This page contains a welcome message, a login button to access the application, and a register button for account registration.



**Fig. 1:** First Screen

##### 2. Second Screen

The second screen is part of Use Case 1, which is the login page of the *Peduli Tani* application. This page contains fields for username and password, a login button, and a link to register an account.



**Fig.2:** Second Screen

##### 3. Third Screen

The third screen is also part of Use Case 1, which is the account registration page for creating a *Peduli Tani* account. This page contains fields for username and password, a register button, and a link to "Login here."

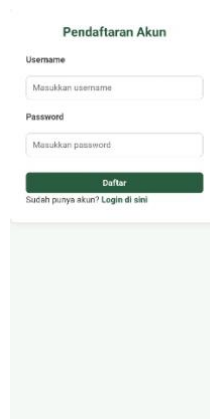


Fig.3: Third Screen

4. Fourth Screen

The fourth screen is part of Use Case 3, which displays the current weather conditions in the user’s area. The weather is detected when the farmer activates the location feature on their phone. This page contains the measurement time, temperature, wind speed, time, weather forecast, and a button to proceed to the guide.



Fig. 4: Fourth Screen

5. Fifth Screen

The fifth screen is part of Use Case 3, which serves as the main agricultural technique guide page to support the productivity of dragon fruit cultivation in the area. This page contains various titles of dragon fruit farming technique guide articles and a button to view the discussion forum.



Fig. 5: Fifth Screen

6. Sixth Screen

The sixth screen is part of Use Case 3, which displays the content of the agricultural technique guide to support the productivity of dragon fruit cultivation in the area. This page contains various dragon fruit farming technique guide articles, a comment box for farmers to discuss or provide feedback, a send button to submit comments, a back-to-guide button, and a button to view the discussion forum.



Fig. 6: Sixth Screen

#### 7. Seventh Screen

The seventh screen is part of Use Case 4, which is the discussion forum page where farmers can read and discuss cultivation techniques. This page contains various dragon fruit farming technique guide articles, farmer comments for discussion, and a button to return to the guide.

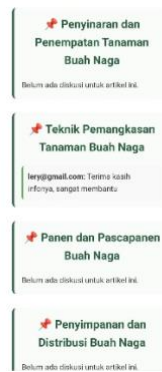


Fig. 7: Seventh Screen

## 5. Conclusion

After the design and development of the application were completed, several conclusions can be drawn as follows:

1. Weather information was successfully displayed in real time using the Open-Meteo API, with temperature, wind speed, weather conditions, and measurement time formatted according to the user's local time when opening the application.
2. Agricultural technique guides specifically for dragon fruit cultivation were successfully presented in the form of engaging and easy-to-understand articles.
3. The provided discussion forum enables farmers to share experiences, engage in discussions, and exchange information regarding agricultural techniques.
4. The application interface was designed to be simple, responsive, and professional, making it easier for users to access all available features.

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